WHAT IS CLAIMED IS:

1. An ion trap device comprising:

a ring electrode and a pair of end cap electrodes;

an RF driver for generating a driving voltage with a driving frequency;

a resonant circuit for amplifying the driving voltage generated by the RF driver to produce an RF voltage applied to at least one of the electrodes; and

a tuning circuit for changing a resonance frequency of the resonant circuit, wherein the tuning circuit is adjusted so that the resonance frequency is shifted from the driving frequency.

2. The ion trap device according to claim 1, wherein, if the resonance frequency deviates in a direction as the RF voltage increases, the resonance frequency of the resonant circuit is shifted in the same direction.

3. The ion trap device according to claim 1, wherein the tuning circuit uses a variable capacitor.

4. The ion trap device according to claim 1, wherein the tuning circuit uses a coil with a core, wherein the core is moved to change the resonance frequency.

5. A method of tuning an ion trap device comprising:

a ring electrode and a pair of end cap electrodes;

an RF driver for generating a driving voltage with a driving frequency;

a resonant circuit for amplifying the driving voltage generated by the RF driver to produce an RF voltage applied to at least one of the electrodes; and

a tuning circuit for changing a resonance frequency of the resonant circuit,

wherein the tuning circuit is adjusted so that the resonance frequency of the resonant circuit is shifted from the driving frequency.

6. The method of tuning an ion trap device according to claim 5, wherein, if the resonance frequency deviates in a direction as the RF voltage increases, the resonance frequency of the resonant circuit is shifted in the same direction.

7. The method of tuning an ion trap device according to claim 5, wherein the tuning circuit uses a variable capacitor.

8. The method of tuning an ion trap device according to claim 5, wherein the tuning circuit uses a coil with a core, wherein the core is moved to change the resonance frequency.